CLAIMS

WHAT IS CLAIMED IS:

[c1] (Currently amended) A compact line of sight stabilization system for use with an imaging system located about an unstable carrier platform, said stabilization system comprising:

at least two mirrors, each of said mirrors being mounted to a fixed platform by aiming means and in a plane substantially parallel to a target to provide substantially orthogonal observation of a ground position;

said aiming means allowing independent rotation of said mirrors about at least one of the axes in the plane of said mirrors;

at least one of said mirrors being mounted by aiming means allowing rotation about at least two of said axes;

a hardware control means for directing said aiming means in response to measurements taken from three orthogonally positioned gyrometers that measure a rotation rate of the unstable carrier platform about the at least two of said axes; wherein the aiming means occurs without reorientation of the fixed platform relative to the unstable carrier platform; and wherein movement of the at least one of said mirrors occurs in a substantially continuous pattern that predicatively mirrors motion of and approximately angular velocities and accelerations of the unstable carrier platform;

said stabilization system being mounted in a line of sight of said imaging system; and

said stabilization system providing at least one of pitch, row, yaw, and forward motion compensation corrections while maintaining consistent image orientation, for said imaging system.

[c2] (Currently amended) [[A]]The stabilization system as in Claim 1 wherein said imaging system comprises at least one of a pushbroom, whiskbroom, [[f]]Fourier transform, and electronically tunable filter type sensor systems.

[c3] (Currently amended) [[A]]The stabilization system as in Claim 1 wherein said imaging system comprises one of a multispectral, hyperspectral, or ultraspectral sensor system.

[c4] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said carrier platform is selected from an airplane, a helicopter, a satellite, an automobile, or a boat.

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[c5] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said aiming means is selected from at least one of a mechanical, piezoelectric, and electromagnetic means.

[c6] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said hardware control means receives movement data from at least one of pitch rate, roll rate, yaw rate, and forward motion rate sensors.

[c7] (Currently amended)[[A]]The stabilization system as in Claim 6 wherein said sensors exist independently of said stabilization system.

[c8] (Currently amended)[[A]]The stabilization system as in Claim 6 where said sensors comprise at least one of an inertial measurement system and an attitude and heading reference system.

[c9] (Cancelled) without prejudice.

[c10] (Currently amended)[[A]]The stabilization system as in Claim 6 wherein said hardware control means comprises a computer system receiving said movement data from said at least one sensor, said computer system additionally comprising algorithm means for determining the current angle of said carrier platform from said sensor data and the integration over time of said movement rates.

[c11] (Currently amended)[[A]]The stabilization system as in Claim 10 wherein said mirrors are aimed responsively to said current angle of said carrier platform.

[c12] (Currently amended) [[A]]The stabilization system as in Claim 11 wherein said computer system comprises additional algorithms to predict subsequent angles for said carrier platform from said movement data and said current angle.

[c13] (Currently amended) [[A]]The stabilization system as in Claim 12 wherein said predictive algorithm additionally accounts for at least one of system noise, drift, and temperature-induced errors.

[c14] (Currently amended)[[A]]The stabilization system as in Claim 12 wherein said hardware control means aims said mirrors to compensate for said predicted new angle, before said carrier platform reaches said new angle.

[c15] (Currently amended)[[A]]The stabilization system as in Claim 12 further comprising a feedback algorithm wherein said feedback algorithm determines whether said line of sight matches the line of sight obtained from said predictive angle algorithm.

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[c16] (Currently amended)[[A]]The stabilization system as in Claim 15 wherein said hardware control means applies an optimization algorithm to compensate for mismatches found by said feedback algorithm.

[c17] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said aiming means causes at least one of said mirrors to rotate such that said mirrors adjust said line of sight of said imaging system providing compensation for at least one of pitch, roll, yaw, and forward motion.

[c18] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said imaging system requires a stable and non-changing image for a relatively longduring exposure time and wherein said stabilization system provides said forward motion compensation to provide said imaging system with said nonchanging image.

[c19] (Currently amended)[[A]]The stabilization system as in Claim 1 wherein said imaging system is an ultraspectral imaging system and wherein said long exposure time is sufficient to capture the complete interferogram.

[c20] (Currently amended) Hardware control means for a compact line of sight stabilization system, said stabilization system comprising:

at least two mirrors in the line of sight of an imaging system for use on a carrier platform capable of being unstable, said mirrors capable of being aimed and mounted in a plane substantially parallel to a target to provide substantially orthogonal observation of a ground position,

said hardware control means receiving movement data

from at least one of pitch rate, roll rate, yaw rate, and

forward motion rate sensors,

said hardware control means aiming said mirrors as required providing at least one of pitch, roll, yaw, and forward motion compensation; wherein said aiming is response to measurements taken from three orthogonally positioned gyrometers that measure a rotation rate of the carrier platform about at least two axes; wherein said aiming occurs without reorientation of the carrier platform; and wherein movement of the at least two mirrors occurs in a substantially continuous pattern that predicatively mirrors motion and travels at approximately angular velocities and accelerations of the carrier platform.

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[c21] (Original) Hardware control means as in Claim 20 comprising a computer system receiving said movement data, said computer system additionally comprising algorithm means for calculating the current angle of said carrier platform from said movement data and the integrating over time of said movement rates.

5   [c22] (Original) Hardware control means as in Claim 21 wherein said mirrors are aimed responsively to said calculated current angle of said carrier platform.

[c23] (Original) Hardware control means as in Claim 22, said computer system storing said carrier platform current angles over time, wherein said algorithm means applies said movement data to said stored angle data to predict subsequent new angles of said carrier

10 platform.

[c24] (Original) Hardware control means as in Claim 23 wherein said predictive algorithm additionally accounts for at least one of system noise, drift, and temperature-induced errors.

[c25] (Original) Hardware control means as in Claim 23 wherein said hardware control

15 means aims said mirrors to compensate for said predicted new angle, before said carrier platform reaches said new angle.

[c26] (Original) Hardware control means as in Claim 23 further comprising a feedback algorithm wherein said feedback algorithm determines whether said line of sight matches the line of sight obtained from said predictive angle algorithm.

20   [c27] (Original) Hardware control means as in Claim 26 wherein said hardware control means applies an optimization algorithm to compensate for mismatches found by said feedback algorithm.

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